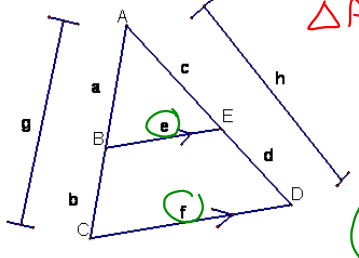
6.6 Using Proportionality Theorems

Theorem 6.4-Triangle Proportionality Theorem If a line is parallel to one side of a triangle and intersects the other two sides, then it divides the two sides proportionally.

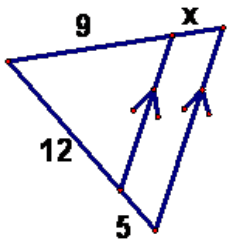


$\triangle ABE \sim \triangle ACD$

$\frac{AB}{AC} = \frac{BE}{CD} = \frac{AE}{AD}$

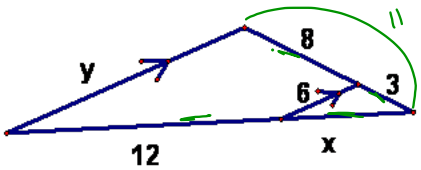
$\frac{a}{g} = \frac{e}{f} = \frac{c}{h}$

$\frac{a}{b} = \frac{c}{d}$



$\frac{9}{x} = \frac{12}{5}$

$x = 3.75$



$\frac{x}{12} = \frac{3}{8}$

$x = 4.5$

$\triangle$s

$\frac{6}{y} = \frac{3}{11}$ SAS $\triangle$

$y = 22$

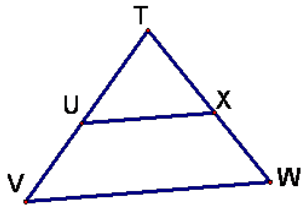
Theorem 6.5-Converse of the triangle proportionality Theorem
If a line intersects two sides of a triangle proportionally, then the line is parallel to the third side.

If

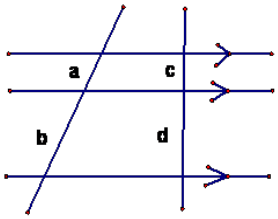
$\frac{TU}{UV} = \frac{TX}{XW}$

then

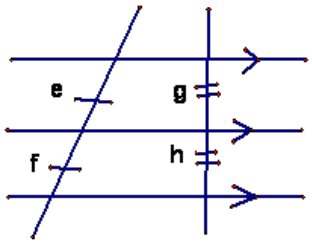
$\overline{UX} \parallel \overline{VW}$

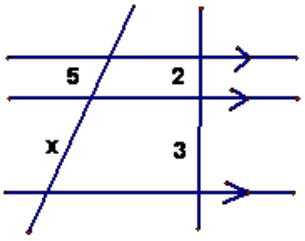


Theorem 6.6-If three or more parallel lines intersect two transversals,
then they divide the transversals proportionally



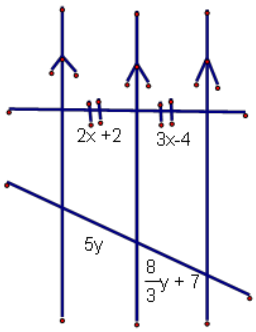
$\frac{a}{b} = \frac{c}{d}$





$\frac{5}{x} = \frac{2}{3}$

$x = 7.5$



$\frac{2x+2}{3x-4} = \frac{5y}{\frac{8}{3}y+7}$

$2x+2 = 3x-4$

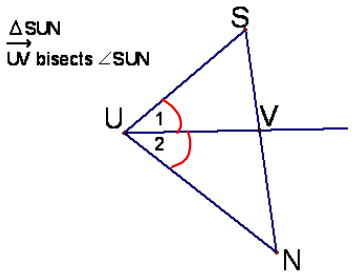
$x = 6$

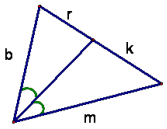
$5y = \frac{8}{3}y + 7$

$y = 3$

Theorem 6.7-If a ray bisects an angle in a triangle, then it divides the opposite side into segments whose lengths are proportional to the lengths of the other two sides.

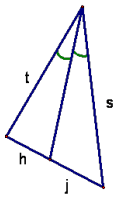
$\frac{SV}{VN} = \frac{SU}{UN}$



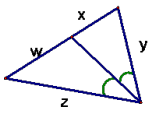


$\frac{b}{r} = \frac{m}{k}$

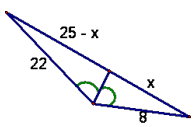
$\frac{r}{k} = \frac{b}{m}$



$\frac{t}{h} = \frac{s}{j}$

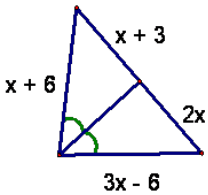


$\frac{w}{z} = \frac{x}{y}$



$\frac{25-x}{22} = \frac{x}{8}$

$x = 6\frac{2}{3}$



$\frac{x+6}{3x-6} = \frac{x+3}{2x+1}$

$(x+6)(2x+1) = (x+3)(3x-6)$

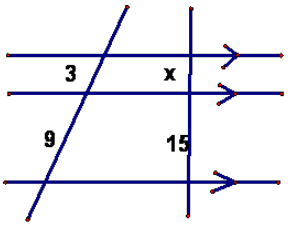
$2x^2 + 13x + 6 = 3x^2 + 3x - 18$

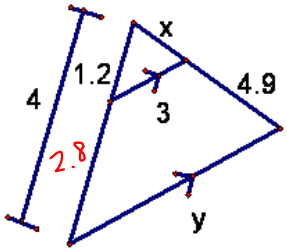
$0 = x^2 - 10x - 24$

-24, -12, +2, -10

$(x-12)(x+2)$

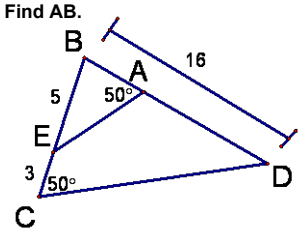
$x = 12$ $x = -2$





$\frac{x}{4.9} = \frac{1.2}{2.8}$ $\frac{3}{y} = \frac{1.2}{4}$

Find AB.



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